R E P O R T R E S U M E S

ED 016 857 VT 004 398

IMPROVING RESEARCH IN BUSINESS EDUCATION. DELTA PI EPSILON MONOGRAPH 105.

BY- LOMAX, PAUL S. WILSON, W. HARMON

PUB DATE 62

EDRS PRICE MF-$0.25 HC-$1.16 27P.

DESCRIPTORS- *RESEARCH METHODOLOGY, *RESEARCH DESIGN, *BUSINESS EDUCATION, *EDUCATIONAL RESEARCH,

THE PURPOSE OF THIS MONOGRAPH IS TO DISCUSS SOME PRINCIPLES OR GUIDES THAT SHOULD BE KEPT IN MIND TO INSURE DEVELOPMENT OF SOUND RESEARCH CONCLUSIONS AND RECOMMENDATIONS BY WHICH THE QUALITY OF BUSINESS EDUCATION CAN BE UPGRADED. THE MAJOR DIVISIONS ARE (1) NATURE OF SCIENCE AND ITS RELATIONSHIP TO PHILOSOPHY AND ART, (2) NATURE OF SCIENTIFIC OR RESEARCH METHODOLOGY, (3) COMPONENTS OF RESEARCH METHODOLOGY, AND (4) SOME WEAKNESSES, PITFALLS, AND FALLACIES IN BUSINESS EDUCATION RESEARCH. SUGGESTIONS ARE MADE FOR IMPROVING THE USE OF RESEARCH METHODOLOGY IN TERMS OF THIE FOLLOWING COMPONENTS WHICH ARE THE ESSENTIAL ELEMENTS OF THE PROCESS OF REFLECTIVE THINKING AND THE LOGICAL DIVISIONS OF A RESEARCH REPORT--(1) THE PROBLEM, (2) HYPOTHESES OR ASSUMPTIONS, (3) BIBLIOGRAPHY OF RELEVANT REFERENCES, (4) METHOD OF SOLUTION OR PROCEDURES WHICH INCLUDES THE HISTORICAL, NORMATIVE-SURVEY, EXPERIMENTAL, PROGNOSTIC OR PREDICTIVE, AND PHILOSOPHIC, (5) PRESENTATION AND INTERPRETATION OF THE DATA AND THE FINDINGS, AND (6) FORMULATION OF CONCLUSIONS AND RECOMMENDATIONS. WEAKNESSIES DISCUSSED INCLUDE LIMITATIONS OF SURVEYS, ASSUMPTION THAT THE MAJORITY IS RIGHT, LACK OF DEPTH, LACK OF AN APPROPRIATE SAMPLE, LACK OF PROPER PERSPECTIVE, FAILURE TO PENETRATE THE PROBLEM, AND ASSUMPTION THAT FREQUENCY OF OCCURRENCE DETERMINES IMPORTANCE. (PS)

ED016857

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

IMPROVING RESEARCH IN BUSINESS EDUCATION

VT004398

MONOGRAPH 105

Sponsored by

Delta Pi Epsilon

IMPROVING RESEARCH IN BUSINESS EDUCATION

by

PAUL S. LOMAX
Professor Emeritus and Former Chairman
Department of Business Education
New York University

W. HARMON WILSON
President
South-Western Publishing Company

Sponsored by
DELTA PI EPSILON
NATIONAL HONORARY GRADUATE FRATERNITY
IN BUSINESS EDUCATION

Editorial Consultant
MILDRED HILLESTAD

1962
H566

Published by
SOUTH-WESTERN PUBLISHING COMPANY
Cincinnati, Ohio 45227 Chicago, Ill. 60644 Dallas, Texas 75202
New Rochelle, N. Y. 10802 Burlingame, Calif. 94010

PREFACE

One of the major purposes of Delta Pi Epsilon is the promotion of sound research that will lead to improved curriculum practices and classroom teaching procedures in business and economic education. This monograph, dealing with research methodology in business and economic education, is concomitant with that purpose. It is not intended as a substitute for a textbook, nor does it exhaust all possible research techniques. It merely focuses attention on some essential principles of research, pinpoints these in relation to business and economic education, warns of common pitfalls to be avoided, and offers concrete suggestions for improving research in business education. The monograph should be of particular value to graduate students engaged in research as well as a handy reference for research advisors.

The authors are well qualified, both from the standpoint of their experience and their mutual recognition of the need to improve research in business and economic education. Dr. Lomax has to his credit many years of teaching research procedures, guiding researchers, and evaluating research studies. For almost as long, Mr. Wilson has been evaluating research, using research in publishing, lecturing to research groups, and advising researchers. Some of the recommendations for educational research incorporated in this publication are based upon methods used in business.

Dr. Mildred Hillestad, Northern Illinois University, drew upon her knowledge of techniques in educational research in editing the manuscript. Delta Pi Epsilon is indebted to all three of these people for their contributions in the preparation of this monograph.

RAY G. PRICE, National Director
Delta Pi Epsilon Research and Service Projects

IMPROVING RESEARCH IN BUSINESS EDUCATION

TABLE OF CONTENTS

	PAGE
NATURE OF SCIENCE AND ITS RELATIONSHIP TO PHILOSOPHY AND ART	1
Purpose of Research	1
Relationship of Science and Philosophy	1
Relationship of Science and Art	1
NATURE OF SCIENTIFIC OR RESEARCH METHODOLOGY	2
COMPONENTS OF RESEARCH METHODOLOGY	2
The Problem	3
Hypotheses or Assumptions	3
Bibliography of Relevant References	4
Method of Solution or Procedures	4
Historical Method	5
Normative-Survey Method	5
Experimental Method	5
Prognostic or Predictive Method	6
Philosophic Research	6
Research Method and Techniques Used	7
Presentation and Interpretation of the Data and the Findings	7
Tabulation and Description of Data	7
Account for Missing Data	7
Formulation of Conclusions and Recommendations	8
Base All Conclusions on Findings	8
Recognize Limited Applications	8
State Conclusions Simply	9
Support Conclusions with Sufficient Data	9
Present Conclusions without Prejudice	10
Account for Uncontrolled Variables	10
Use Only Data Collected with Adequate Instruments	11
Make Recommendations	11
Summary of Main Divisions of a Research Report	12
SOME WEAKNESSES, PITFALLS, AND FALLACIES IN BUSINESS EDUCATION RESEARCH	12
Limitations of Surveys	12
Majority May Not Be Right	13
The Wants of a Businessman May Not Be His Needs	14
Answers May Not Be Reliable	15
Research May Not Be in Depth	15
Questions May Not Elicit Required Information	16
Sample May Not Be Appropriate	16
Lack of Proper Perspective	17
Avoid Use of Wrong Assumptions	18
Weakness of the Rule of Frequency	18
Failure to Penetrate the Problem	19
One Thousand Casual Opinions vs. One Careful Observation	20
CONCLUSION	21

IMPROVING RESEARCH IN BUSINESS EDUCATION

Intelligent use of research methodology is one of the main ways to solve problems and to bring about improvements in business education. Every year hundreds of research studies are made in this field in an effort to solve troublesome problems. How confidently can classroom teachers and others concerned with education for business rely on the conclusions of these research studies to serve as valid and reliable guides for the improvement of business education programs?

The purpose of this monograph is to discuss some principles or guides that should be kept in mind to insure development of sound research conclusions and recommendations by which the quality of business education can be upgraded. The monograph is organized in four main divisions: (1) nature of science and its relationship to philosophy and art; (2) nature of scientific or research methodology; (3) components of research methodology; and (4) some weaknesses, pitfalls, and fallacies in business education research. It is assumed that these considerations are important to graduate students and to business teachers who produce research studies and to those who evaluate and use the conclusions of such studies.

NATURE OF SCIENCE AND ITS RELATIONSHIP TO PHILOSOPHY AND ART

Science is regarded as a body of knowledge that has been rigorously determined by research and resolved into its fundamental principles. Accounting, for example, should be viewed as a body of scientific knowledge in the sense and to the extent that it has been thoroughly tested by rigorous research methods and organized into its basic principles. Until a body of knowledge is thus investigated and tested and its primary principles ascertained, it is not ordinarily ready to be used as a matured course of instruction in the education of students.

Purpose of Research

The purpose of research is to search in an organized and scholarly manner for a better way of doing things. In all educational endeavor, it is well to assume that there must be a better way. On the other hand, until the claimed new way *is* demonstrated by competent research to be a better way, the old way should usually continue to be used. The results of such research create, maintain, and improve the quality of business education.

Relationship of Science and Philosophy

If we think of science as being factual in nature, that is, having to do with what *has been*, what *is now*, and what *probably will be*, and if we regard philosophy as what *should have been* and what *should* BE in the present and the future, then we may describe science as the REALM OF ASCERTAINED FACTS and philosophy as the REALM OF VALUES. Science and philosophy thus become complementary in nature. All research in business education should be developed and evaluated either by the wisdom of philosophy or by a code of values expressed in terms of what should be.

Relationship of Science and Art

We look to *science* as a primary source of principles by which teachers are to be guided in their *art* of teaching. Dewey discussed the question of the science and the art of teaching as follows:

> If there were an opposition between science and art, I should be compelled to side with those who assert that education is an art. But there is no opposition, although there is a distinction. We must not be misled by words. Engineering is, in actual practice, an art. But it is an art that progressively incorporates more and more of science into itself, more of mathematics, physics, and chemistry. It is the kind of art it is precisely because of a content of scientific subject-matter which guides it as a practical operation.[1]

Dewey uses an illustration of bridge building, which incorporates both an art and a science.[2] Consider the example of the George Washington Bridge. Artisans built the bridge, but this was done according to principles embodied in a science of bridge construction. So it is in the subjects of accounting, business law, shorthand, and other areas of business education. There is an art in teaching these subjects, and there is a science in the subject-matter of these subjects in the sense of their having a body of knowledge organized in terms of basic principles which have been scientifically determined. The art of teaching is also dependent upon a science of learning. The quality of the educational growth of a student is determined both by skillful teaching and learning and by thorough understanding of subject matter in terms of its cardinal principles.

NATURE OF SCIENTIFIC OR RESEARCH METHODOLOGY

Scientific or research methodology is essentially the same process as that of reflective thinking as found in inductive and deductive reasoning. No research problem is completely solved until it is processed both inductively and deductively. When a conclusion or generalization is built up inductively from a group of particular experiences that characterize a given problem, then the conclusion is verified deductively by another group of particular experiences. A researcher, for example, may have developed inductively in his experiment a very effective method of teaching business arithmetic according to *his* research data. A classroom teacher, however much interested in the researcher's conclusion as to an effective method, should not blindly accept the conclusion but should test it in his own teaching experience.

It is very important for a classroom teacher-evaluator of research conclusions to keep in mind the fact that such conclusions, especially in a social science, are rarely completely and positively established. They tend to be only tentatively and partially established. However, the degree of confidence one may have in the results of an investigation is definitely and precisely stated in a properly-designed, rigorously controlled experiment; and the sample used and the way it was selected determine the extent to which the results may be generalized.

COMPONENTS OF RESEARCH METHODOLOGY

Suggestions are made for improvement of the use of research methodology in terms of the following components which are likewise essential elements of the process of reflective thinking: (1) the problem, (2) hypotheses or assumptions, (3) bibliography of relevant references, (4) method of solution or procedures, (5) presentation and interpretation of the data and the findings, and (6) formulation of conclusions and recommendations.

These suggestions are intended to supplement a full discussion of the essential things to consider in the preparation of the main divisions of a research report, as found in references on educational research. The discussion of the

[1] Dewey, John. *The Sources of a Science of Education*, New York: Horace Liveright, 1929, p. 12.
[2] Ibid., pp. 34-35.

problem division in this monograph, for example, is limited to the two factors of the selection of a problem and the analysis of the problem. A careful consideration of these two essentials is especially needed to improve research in business education. However, other factors should be included in a research report, such as the *need* for the study, a statement of the *delimitations* of the research investigation, and definitions of any technical terms which may be involved in the statement and analysis of the research problem.

The Problem

In the selection of a problem for investigation, the primary considerations are that it be one in which the person has a deep-seated interest and that it be in an area of knowledge and experience in which he is competent. Often a person undertakes a research study that for certain reasons appeals to him but for which he has inadequate preparation. The result is often a superficial investigation.

After a problem has been judiciously selected and the controlling purpose of its investigation has been simply and briefly stated, its main parts or chief questions should be analyzed. These principal parts ordinarily should be few in number—not more than three to six. Many more questions will perhaps come to mind during the analysis of the problem, but many of them will be found to be subdivisions of the problem's main or component parts. The analysis of the problem must necessarily be kept simple in outline. Moreover, each part should be worded in simple language. Many persons prefer to keep the wording in question form because a question helps to sharpen the issue to be researched.[3]

Kettering has given this sage advice in regard to problems:

> It is very interesting that most people look at problems as being complicated. We cannot solve the complicated problem. Consequently, we have to analyze it and bring it down to the most elementary things in the world. We have a motto in our research laboratory that reads, 'This problem, when solved, will be simple,' because every one we have ever had has been simple. We don't think anybody can solve a complicated one.[4]

Hypotheses or Assumptions

Hypotheses or assumptions should be stated for the main questions. This step in the planning of a research inquiry is frequently omitted by researchers in business education. However, in experimental studies, a statement of the hypotheses to be tested is essential.

Hypotheses are guides for the investigator in the entire process of his research endeavor and they keep him on the main line of his study.[5] They tend to serve as *assumed* answers to his principal questions, the correctness of which he assesses in the course of the study. Open mindedness and persistent objectivity in testing his hypotheses during the course of his research study are essential.

In a research study of the teaching of business law, for instance, one of the main questions of a researcher was, "What is the optimum class size for the

---

[3] Lomax, Paul S., "High School Education for Business Needs Over-All Researching," *American Business Education*, 16:185-187, 192, March, 1960. The writer gives in this article an example of a problem analysis.

[4] University of the State of New York. "An Inventor Gives a Challenge." *Bulletin to the Schools*, 37:76, November, 1950. Charles Franklin Kettering was director of the research division of the General Motors Corporation for many years.

[5] Good, Carter V., *Introduction to Educational Research*, New York: Appleton-Century-Crofts, Inc., 1959, pp. 77-80.

attainment of desirable student learning results?" The main hypothesis for this question might be: Class size is not the *basic* determiner of teaching effectiveness. An alternative hypothesis might be: It is the *quality* of the teaching and learning rather than class size, which affects learning outcomes.[6] Stated in terms which may be statistically tested for differences, the hypothesis would be: There is no difference in learning outcomes of business law classes of different sizes.

Sometimes data are collected and findings derived from them in order to solve the problem in accordance with the investigator's assumptions. If the assumptions are wrong or inadequate, data are collected from which, consequently, wrong conclusions are drawn.

Bibliography of Relevant References

A person well-qualified to undertake the investigation of a given problem already knows at least some of the most important literature relevant to his research problem. He is well-acquainted with some of the research conclusions and general principles that have been established in the field of his chosen problem. He also knows some of the leaders in both the general and specialized areas of his problem. In consulting with his advisor regarding the appropriateness of his proposed research problem, the graduate student reveals his fitness for handling the investigation by his knowledge, or lack of knowledge, of relevant key references and names of leaders in his field.

In the portion of the thesis devoted to the review of the literature, the researcher should clearly and succinctly present the references which he has found to be relevant to his problem. For each piece of research reported, he should give briefly the pertinent findings and conclusions. He may evaluate the research methods used by the author and show whether or not the conclusions are justified on the basis of the data presented and the procedures used. If the conclusions are valid, the researcher in another section of his thesis should compare his own findings and conclusions with those reported in the literature. The failure to make such comparisons is a frequent weakness in business education research studies.

Because, at the outset of a research study, it is unlikely that the researcher can anticipate all points of relevance of the selected references included in his review of the literature, this review is often revised upon completion of the research investigation.

Method of Solution or Procedures

The selection of a primary method of investigation of a given problem is a key consideration. On page 5 is an elementary classification of basic methods of research to serve as a guide to a graduate thesis writer in the choice of a primary research method to be used in solving his problem.

This classification scheme is an endeavor to show (1) that all factual knowledge which is ascertained by research may be classified in terms of three areas of time: past, present, and future; and (2) that the resultant findings need to be evaluated on the basis of *what should be*. A researcher must decide in which area of time his thesis problem is mainly centered. On the basis of that decision he selects his basic research method, the distinctive criteria of which he must carefully observe in the investigation of his problem.

---

[6] U. S. Office of Education, *New Dimensions in Higher Education*, No. 2, Effectiveness in Teaching, Washington 25, D. C: Government Printing Office, 1960, p. 3.

CLASSIFICATION OF BASIC METHODS OF RESEARCH

Realm of Science (Scientifically determined data)	*Realm of Values* (Criteria or basic principles by which to evaluate what has been, what is, and what probably will be)
The Past: What has been? *Historical* research method	What should be? *Philosophic* research
The Present: What is now occurring? *Normative-survey* research method *Experimental* research method	
The Future: What probably will be? *Prognostic* or *Predictive* research method	

Historical Method. The investigation of how accounting systems were developed by various civilizations over a long period of time would perhaps require perusal of documents, records, and past writings which reveal the systems used in the past. Obviously, this is a study employing the historical method. Gregg's study of shorthand teaching methods prior to 1900 illustrates the use of this method.[7]

Normative-Survey Method. On the other hand, a study involving current practices requires a *normative-survey* or *descriptive* method. Such studies may cover a wide range of subjects, each of which may require a different data-collecting technique. Silverthorn's study of word usage in business communication [8] entailed a count of words used in a stratified random sample of business letters, telegrams, and reports collected from all kinds of business establishments. Data concerning the acceptability of certain English usages in the offices of major oil companies were collected by interviewing executives and their secretaries.[9] Each year many follow-up studies of graduates are conducted by means of questionnaires. Rather than studying a problem relatively broadly as illustrated by the examples above, a very thorough, penetrating, detailed study might be made of a narrow segment of a particular problem as in a case study; e.g., the study of the effect of electronic data processing on a particular firm. Time-study (observation) of a certain process or of tasks performed may supply information concerning current practices in the office or in school.[10, 11] All of these means of collecting data fall under the general research method known as *normative-survey* or *descriptive* method.

Experimental Method. The comparative evaluation of different teaching methods or the relative effect on learning of various teaching materials would be carried out with the *experimental* method. Such studies involve statistical tests of hypotheses and must state the probability with which generalizations

---

[7] Gregg, Edna, *The Teaching of Shorthand Prior to 1900*, Unpublished Ed.D. Thesis, Bloomington, Ind.: Indiana University, 1955.

[8] Silverthorn, James E., *The Basic Vocabulary of Written Business Communications*, Unpublished Ed. D. Thesis, Bloomington, Ind.: Indiana University, 1955.

[9] Lis, Anthony S., *Attitudes and Practices of Executives and Secretaries Concerning Disputable Items of English Usage in Secretarial Handbooks*, Unpublished Ph.D. Thesis, Minneapolis, Minnesota: University of Minnesota, 1961.

[10] Casebier, Eleanor, *A Time Study of Activities and Responsibilities of Secretaries with Implications for the Training of Prospective Secretaries*, Unpublished Ph.D. Thesis, Northwestern University, 1957.

[11] Jester, Donald, *A Time Study of Shorthand Transcription Problems with Implications for the Improvement of Transcription Training*, Unpublished Ph.D. Thesis, Northwestern University, 1958.

can be made. Experimental conditions must be controlled so that the investigator can state the degree of confidence the reader may have that the reported results are due to the experimental treatment and not to related but uncontrolled elements in the experimental situation. For instance, in a study comparing the different teaching methods, the effectiveness of the teacher is likely to be confounded with the method used when such an experiment is conducted in classes taught by several different teachers. Unless definite probability statements can be made relative to the differences between results obtained in the experimental groups, the study is not an experiment, but merely observations that certain things happened in these circumstances. Readers would have no assurance that these same results would obtain in a repetition of the so-called experiment.

Prognostic or Predictive Method. Another common research problem in business education is that of prediction—whether it be of scholastic success in college or in a particular course, or the prediction of difficulty of test copy. Such studies commonly involve the correlation between predictor and criterion variables. Prediction of success (or failure) on a criterion measure may be made from one or more predictors (dependent variables). With the availability of electronic computers, for which multiple correlation is a standard program, over thirty predictor variables may be used in a single problem, where before, prediction involving more than five variables was a rather formidable task. The researcher must be especially careful in his interpretation of the results of a prediction study, for such a study merely shows the extent of *relationship* or *association* between predictor and criterion measures and does not show cause and effect.

Philosophic Research. A research problem dealing with "qualitative values, as leading to things done," [12] is in the realm of philosophic research. Whitney characterizes such research as being "reflective thinking on levels of extensive generalizations, above the realm of fact-finding science." [13] But he goes on to point out that philosophical investigation should not be considered a basic method of research. Actually, philosophical research may employ any of the basic research methods and demand rigorous controls and measurement, for the main difference between science and philosophy is "in the basic material with which they work and the level of value at which they arrive." [14]

Research concerning objectives and fundamentals of business education are philosophic problems, but a statement concerning them might be formulated by consideration of opinions and statements by leaders and authorities in the various areas of business education. Thus, actually a normative-survey research method may be called for. Consideration of these statements in light of conditions leading to the current thinking of these leaders may call also for the historical method.

This discussion of research methods has considered only what may be regarded as basic research methods. Other variations of these primary research methods are discussed in textbooks on educational research. An example would be a study of student development and growth in the learning of a particular business subject.[15]

---

[12] Whitney, Frederick L., *The Elements of Research*, citing Freeman, F. N., in *The Scientific Movement in Education*, Chicago: National Society for the Study of Education, 37th Yearbook, Pt. II, 1938, p. 488.

[13] Whitney, Frederick L., *The Elements of Research*, Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1950, p. 247.

[14] *Ibid.*, p. 250.

[15] Good, Carter V., *Introduction to Educational Research*, New York: Appleton-Century-Crofts, Inc., 1959, Chapter 6; also Barr, Arvil S.; Davis, Robert A.; and Johnson, Palmer O., *Educational Research and Appraisal*, New York: J. B. Lippincott, 1953, Chapter 11.

Research Method and Techniques Used. The researcher must also distinguish between a research method, such as the experimental or the normative-survey method, and a technique, such as a measurement technique to be used in conducting an experiment or in gathering data concerning problem-solving ability in a group of business students. Other examples of techniques used to collect data in one or more of the primary methods are interview, observation, job analysis, rating scales, testing, and the questionnaire. The latter is often incorrectly referred to as a research method. Also, there are English and library techniques which are used in all research methods.

While a research investigation deals primarily with either past, present, or probable future phenomena, every research study has its own past, present, and future aspects which need to be considered. For instance, any research study of present-day happenings, as in an appraisal of the business curriculum in the secondary school, has its historical background to be accounted for and the implications for its future development to be made. Indeed, the dominant purpose of all research endeavor is to find out how to do better in the future what has been done in the past and what is being done at present.

Presentation and Interpretation of the Data and the Findings

The presentation and interpretation of the data collected and the findings derived from them generally constitute a chapter or two of a research report. Preparation of the data for presentation usually involves summary and classification of the information gathered. Presentation of the data involves making statements regarding what the data show, and their interpretation is the explanation of these results.

Tabulation and Description of Data. In the tabulation and description of data which have been collected to answer his questions, the researcher should keep in mind two important considerations. First, the headings and subheadings of tables and graphs must be as complete and clear as possible so that they will tend to be self-explanatory. Second, the descriptions of the tables and graphs should likewise be made very complete and clear in order that they, too, are self-explanatory, with important facts, trends, relationships, and so on, clearly pointed out. Thus clarity of meaning of the data presented is made doubly certain.

Account for Missing Data. All possible and essential data which may be involved in a given research problem are rarely, if ever, obtained by a graduate student in the preparation of his thesis. Consequently, in describing and interpreting his data to obtain the answer to the problem, he must be constantly on his guard to account for all possible factors and considerations which are pertinent both to data he has and data he did not get, even though he demonstrates statistically that his data are a good representative sample.

To give an illustration, a master's degree candidate, a high school business teacher, made a follow-up study of a selected group of high school graduates who had taken business courses. The purpose of this study was to find out what uses the graduates from the investigator's school had made of their business courses in employment. He used the questionnaire technique and received replies from 125 people, or 44.8 per cent of the 279 graduates of the school years 1954, 1955, and 1956 who had had one or more business subjects in the high school.

One of the reported findings of this investigation was that the subject which most graduates wished that they had taken in high school was second-year bookkeeping. However, the investigator should have carefully pointed out in this case that this result may perhaps have been due to the fact that only a

certain type of student, and not a majority of the graduates, had replied to the questionnaire. Perhaps only those most successful in the business world were secure enough in their positions to reveal their feelings on the questions asked; or perhaps with regard to a particular question about the use of bookkeeping following graduation from high school, the positions held by the respondents might have required extensive training in this area while the nonrespondents did not need the added work in bookkeeping. These data, if organized and interpreted in the light of the positions held by the respondents, would have been more accurate and would have provided more meaningful information than merely a statement that most graduates felt they should have taken second-year bookkeeping in high school.

The nature and probable influences of the kinds of selection that may result from nonresponse in follow-up surveys in business education are treated in a recent study by Lowry.[16]

Formulation of Conclusions and Recommendations

Conclusions are usually reserved for statement following presentation and interpretation of the findings, often in a separate chapter of the report.

Base All Conclusions on Findings. Conclusions must be based only on the findings. However, elements other than the findings themselves must be taken into consideration when conclusions are drawn. In the illustration above regarding the finding that most graduates who responded to the questionnaire regarded second-year bookkeeping desirable, the conclusion that such a course should be introduced into the business curriculum might be unjustified.

The investigator had not heard from 55.2 per cent of the graduates, involving 69 per cent of the men and 53 per cent of the women. Moreover, how representative were his limited data of the office, retailing, and other kinds of positions held by these graduates? What kinds of bookkeeping preparation in high school were called for in the kinds of positions open to high school graduates in various lines of business? These and many other questions needed thoughtful consideration by this master's candidate in drawing conclusions from the data presented.

Recognize Limited Applications. A researcher must be constantly alert not to claim a wider application of his conclusions than the narrow confines of his data justify. If he were to collect another set of data, for example, from another group of students in other high schools, he would be concluding from another array of particulars and, consequently, the different data and their interpretation might lead to a modified and possibly very different conclusion.

Another master's degree candidate endeavored, in his research investigation, to determine from the business graduates of his high school how effective the business curriculum was for them in their employment. He mailed a questionnaire to 177 graduates of the school years 1955, 1956, and 1957 who had had at least three business subjects in their high school preparation. Of the 177 graduates, 126 or 71.2 per cent replied. Of the 126, 18 were still attending college, leaving 61 per cent usable replies.

One of the findings reported in this research study was that shorthand was considered the least valuable subject studied by the graduates replying to the survey. In the interpretation of this finding and the conclusion to be drawn from it, what are some of the questions which should be carefully considered by the researcher? How were the 108 graduates (excluding the 18 still in college) divided between men and women? In what kinds of beginning business positions did these graduates find employment? In what kinds of business were these

[16] Lowry, Robert A., *Principles of Follow-Up Research in Business Education.* Unpublished Ed.D. Thesis, Bloomington, Ind.: Indiana University, 1958, pp. 153-165.

positions located? What were the prevailing requirements in education and experience of stenographic positions available to high school graduates in the school's employment community? What was the practice of the high school guidance counselors in advising students into the shorthand classes which were intended to prepare students for employment?

Only after a rigorous examination and interpretation of answers to these and other questions, would the researcher be in a position to attempt to draw a conclusion from his data. And when he had made his conclusion, he should not have claimed any wider application of it than the particulars of his data justified. The conclusion could not be applied to any other high school; and unless the fact were established that the present class was no different from those classes surveyed in the study, the conclusion could not properly be applied to it either. The conclusion might simply have been that the high school of these graduates had a very poor guidance program for students who desired or might well have desired to prepare for office employment.

State Conclusions Simply. One criterion of a good conclusion, which has been generalized from a research finding, is that it should be stated as simply as possible. It is simple language which most clearly explains to a lay leader or school user the practical meaning and significance of a conclusion. Let us consider two examples:

1. A research investigation was made to find "the relationship between inaccuracy of writing shorthand outlines of Gregg Shorthand Simplified and errors in transcription." A conclusion which this researcher drew from his findings was: "A significant relationship exists between accuracy in application of principles and accuracy in transcription." [17]

2. In the second cited study, television was used to determine whether it can be used as an effective means of teaching typewriting. One conclusion that resulted from the findings of this inquiry was this: "The study would seem to imply that televised instruction cannot be considered a substitute for superior classroom teaching by an individual. . . ." [18]

These examples show that the writers avoided ambiguous statements, and they avoided technical jargon, making the conclusions clear and easily understood.

Besides the common pitfalls in the interpretation of the data and the danger of drawing unjustifiable conclusions previously discussed, several other factors may account for incorrect interpretations and conclusions which might be made by the beginning researcher.

Support Conclusions with Sufficient Data. A sometimes troublesome problem for a researcher is that of the inability to get a sufficient amount of data of the kind needed to answer adequately one of the questions raised in his research investigation. Such an inadequacy of data should be frankly admitted by the researcher in his report rather than glossed over in a general, meaningless statement of some sort, or still worse, entirely ignored.

Suppose a graduate student made a research study of business education in the junior colleges of his state. He may have been very successful in procuring sufficient data to answer four of the five main questions or issues for which he sought answers. The one exception had to do with the second part of the question, "What are the high school backgrounds of the students who

[17] Fermenich, William F., "An Analysis of the Relationship Between Applications of Some Principles of Gregg Shorthand Simplified and Errors in Transcription," *National Business Education Quarterly*, 29:25-26, October, 1960.

[18] Crawford, T. James, "Teaching Typewriting by Television," *The Balance Sheet*, 41:244-246, 253, February, 1960.

enrolled in the different business curriculums, and what are the reasons why they chose them?" Sufficient data about the students' high school backgrounds were easily available because the investigator had access to the excellent student records in the schools. However, adequate statements of the reasons why students chose the particular business curriculums were difficult to obtain. Not only did a small percentage of the students answer this question, but also those who did anwser often gave sketchy answers or answers that were hard to interpret consistently.

In such a situation a researcher should frankly present the insufficient data obtained, tell what he did to try to get adequate information, and explain in what respects he regards the data to be unsatisfactory. He should add, as a result of his experience, what he would do to improve his procedures if he were again to attempt to collect the needed data. At times a researcher will find it difficult, if not impossible within the limits of time and cost, to get full and sufficient information, assuming that he has made every reasonable effort to obtain the essential data.

Present Conclusions without Prejudice. In the interpretation of his data, the investigator should present both pro and con considerations in his interpretation of the meaning and significance of the data. He should cultivate the quality of open-mindedness. He must be able to entertain interpretations which are contrary to his experience and thinking.

This objective may be accomplished effectively by comparing the findings and conclusions of relevant research studies of other investigators with those in one's own study. Very often a researcher will present in his report an excellent review of other research findings and conclusions pertinent to his own problem; but when he presents his own data in the body of his report, he fails to compare them with the researches of others. Such comparisons are a real and an arduous test of his best thinking and best contribution to the improvement of business education. When he makes this comparison, however, he must be constantly alert to point out both similarities and dissimilarities of the compared research studies since they are rarely, if ever, exactly alike in all respects.

A doctoral degree candidate, for example, studied the prevailing objectives of business education in the secondary schools in the United States. He felt strongly that the predominant objective of business education during the 1960's should be a thorough study of the business economy and of the business knowledges and practices which all consumers of business goods and services should possess. His deep-seated, over-riding conviction or bias caused him to be unable or unwilling to weigh fully and objectively findings and conclusions of other pertinent researches in which the contention was that the vocational objective was the *primary* one to stress in the high school program of business education. As a result, his research report became an apparently prejudiced one rather than one in which an open-minded appraisal of the pro's and con's of critical thinking was made of both the general and vocational education objectives of secondary business education.

Account for Uncontrolled Variables. One common weakness of a graduate degree researcher is a failure to take into account all possible factors or variables that may be involved in his interpretation of the data which he has collected to answer his questions. The result is that his findings and conclusions are likely to be faulty in certain respects.

A master's degree researcher, for instance, made a survey of office machines being used in the government and business offices of his state capital for the purpose of determining what office equipment should be purchased for the busi-

ness education program of the public high school in which he taught. One of his findings was that 73.4 per cent of the 52 office managers whom he interviewed stated that when they next purchase typewriters, they plan to buy electric ones. He recommended from this finding that one of the two typewriting rooms of his high school should be equipped entirely with electric typewriters so soon as possible. In his interpretation and evaluation of the data, he did not mention that at the time of his study estimates were that about three-fourths of the typewriters in use in the offices were manual machines. Moreover, he did not present in his report a careful consideration of the relative merits of the manual and electric typewriters in the learning of typewriting or of the problem of the transfer of students from the manual to the electric typewriter near the end of the typewriting course of training. He also did not mention that about half of the 52 office managers whom he consulted had in their organizations training programs for office machine operators. Too, he did not take into account the relative cost of manual and electric typewriters even though a school bond issue had recently been voted down in his city and the assessment and tax rates of his city were comparatively high.

Every research worker, when he interprets his data, must try to think of every possible factor that might be related to the problem situation that he is evaluating. Otherwise, he will not draw sound conclusions from his data, and he will not make plausible recommendations for the improvement of the business education programs.

Use Only Data Collected with Adequate Instruments. One of the main criteria of the experimental method of research is that reliable instruments of measurement be used to determine outcomes, as in the case of measuring the amount of learning resulting from the use of various methods or materials in the classroom.

Few "standardized" tests are available for the various business subjects, and some of those that have been published do not meet the requirements for adequate measurement. Often an investigator whose required data are test results will need first to determine whether any test which he would like to use does actually meet the criteria of adequate measurement: Does it actually measure the characteristics or skill or knowledge it purports to measure (validity)? Is one likely to obtain the same results if the instrument (test) is used again in a similar situation (reliability)? If an experimental investigation, for instance, is conducted with a test of unknown or doubtful reliability, the reader of the research report cannot know how much confidence he should have in the findings of the study. He has no way of knowing what the probability is that these same results would obtain in his own similar situation.

Thus, in interpreting data and drawing conclusions in a research study, the investigator must account for any insufficiency in his data, he should keep an open mind to avoid prejudiced presentation of his findings, he must recognize and account for uncontrolled variables which may have affected the outcome of the experiment or investigation; and he must use reliable and valid measuring instruments for collecting data. These cautions, together with a carefully thought out design or plan of procedure and analysis, will do much to aid in the improvement of research in business education.

Make Recommendations. Two kinds of recommendations may be formulated after the conclusions of a research study have been made. The first type of recommendation is that which stems from and is supported by the findings and conclusions of the investigation. The second is that which may be made regardless of whether or not it is backed up by the research findings and

generalizations. Such recommendations are simply additional ones which the researcher feels are important considerations which other investigators and practitioners should entertain. These may be the suggestions for further study found in many graduate theses.

Summary of Main Divisions of a Research Report

The main parts of a research report are shown below in outline form, along with the relationship of the parts, one to another.

COMPONENTS OF A RESEARCH REPORT

Statement of the Controlling Purpose of the Research Study

The Problem	Method of Solution or Procedures	Presentation of Data and Their Interpretation	Conclusions and Recommendations	Bibliography
What are the main questions to be answered?	What primary research method should be used to answer the questions?	What are the findings or answers to the questions?	What are the conclusions drawn from the findings?	What are the principal research reports and other references which are relevant to this research study?
What are the hypotheses to guide the search for answers?	What techniques should be used with this method to collect data?	What are the researcher's interpretations of the findings?	What are the recommendations resulting from the research study?	

A full discussion of essentials to consider in the preparation of these five main divisions of a research report will be found in references on educational research methodology. It is important to keep in mind that this outline is limited to a few key questions to show some of the interrelationships of the five divisions.

The various parts of a research study have been described, though necessarily briefly. However, the mere putting together of these parts does not guarantee that a *good* piece of research will result. If one conducting a research investigation is aware of certain weaknesses commonly found in research that has been done previously, he may be able to avoid these weaknesses in his own research. These weaknesses might be such things as the incorrect choice of research method, biases, inadequate sampling, or improper interpretation of the findings.

SOME WEAKNESSES, PITFALLS, AND FALLACIES IN BUSINESS EDUCATION RESEARCH

Limitations of Surveys. An overwhelming percentage of studies in business education are descriptive and most of these are surveys of one kind or another. Of the 464 research studies done in the five-year period 1952-1956, Himstreet[18] found that only 3.7 per cent were experimental, and a search of the reported studies since that time would likely show the same proportions.

A survey type of research or study is often called "nose counting." It may serve a useful purpose, but in itself does not provide all the needed answers. A survey attempts to find out what the current situation is. It answers questions such as: What is the rate and what degree of accuracy is achieved by students in beginning typewriting classes? What are the opinions held by business men regarding the standards of performance of office workers? What knowledges concerning our economic life are essential for all citizens today? The survey

[18] Himstreet, William C., *"Analysis and Criticism of Research in Business Education, 1952-1956,"* The *Balance Sheet*, 40:148-151, December, 1958.

serves a useful purpose, indeed, but in itself it does not provide all the needed answers. It cannot answer questions about the future. Prevailing and representative problems may be discovered through surveys in the same way as the geologist surveys an extensive area of land to locate likely oil pockets.

When the specific problems are brought into focus and identified, rigorous experimentation is needed to establish the new knowledges to be derived from the problem situations. Surveys and correlational studies may clearly show relationships, but the particular thing or things related to the outcomes may not be the cause of those outcomes. Rather something not covered in the study may be the actual cause.

For instance, a high positive correlation is found for a given group of representative high school seniors between their knowledge of language skills and their correct use of these skills in shorthand transcription units of the school's secretarial practice course. However, when these same students begin their business employment, a much lower positive correlation is found between their knowledge of language skills and their correct use of these skills in actual office transcription work during the first six months of their employment. What are the causes and effects that will explain the differences in the quality of transcription achievement under school secretarial practice conditions and under actual business practice conditions? Rigorous experimentation is required to find the specific causes and effects that are at work in the business office and to help the school to improve its secretarial practice course.

Surveys bring to light much necessary information and may establish and identify problem areas, such as the need for new teaching materials in a particular subject. The real value of any proposed materials (or procedures) in the classroom can be established only through rigorous, well-controlled experiments. Much more of this type of research needs doing in business education.

However, many people are afraid of experimental research, for they think that it is too difficult and that it will take too much time. True, experimentation requires a certain amount of statistical calculation; but properly constructed and conducted, a thoroughgoing survey will often require as much know-how as is required for conducting experiments. Analysis of the findings from a survey, if the study is to be more than merely descriptive, may require as much statistical analysis as other kinds of research.

Majority May Not Be Right. Frequently as a result of surveys of current practices in the teaching of business subjects, a recommendation is made that a certain practice reported by the greatest number of teachers who responded to the questionnaire be adopted for general use. The assumption here is that what is being done is what ought to be done in teaching and that because a given practice is used by most of the teachers it is the best one to use.

Some surveys of opinions may be justified, provided they are recognized as opinion, but the difficulty is that opinions may be depended upon as answers to problems instead of relying on other types of research that will give more accurate answers.

A study of the opinion type of research tends to cause the continuation of what has always been done. Minority practices, on the other hand, *may* be the best practices. For example, a study may show that certain practices in letter styles are followed by the majority of business firms. These practices, however, may not necessarily be good practices. If we follow the majority rule, we may perpetuate bad practices. The difficulty, of course, is in determining what are the desirable practices. This calls for both qualitative and quantitative research with much more emphasis on the *qualitative* than we often give in

business education research studies. Anything *new* has to start as a minority practice, but all that is new is not necessarily good.

We need to "realize that all great new advances must come through the door marked heresy. Not all the ideas that enter that way are good. Far from it. But, although not all heretical ideas are good, all good ideas are heretical—at first. . . . It is a matter of direct observation that the earth appears to be motionless and that the sun moves around it—this is 'commonsense.' Yet Copernicus and Galileo asserted the contrary. What they said—that the earth moves around the sun—was almost as much an affront to commonsense as saying two plus two equals five, but they said it." [20]

So it tends to be with almost all new ideas, inventions, and discoveries. Progress comes from the minority and sometimes just from individuals. Years ago our business writing in the office was done by pen and ink, and many people laughed about the use of the typewriter, but the minority use of the typewriter has now become the majority use. Years ago most businessmen kept their records by the single-entry method, but today most business concerns use the double-entry method. PROGRESS HAS COME FROM THE IDEAS, INVENTIONS, AND DISCOVERIES OF THE MINORITY. Anything that tends to freeze majority ideas and practices or to discourage experimentation or something new tends to destroy progress.

When we make a study of opinions in a survey type of research, much depends on the caliber of the people who give the opinions. Are those who are questioned both qualified and willing to give correct opinions? We may discover that even those in the majority do not necessarily mean what they say. Certainly, we cannot assume that one hundred answers are better than one right answer.

The Wants of a Businessman May Not Be His Needs. The businessman may say, for example, that he wants only a fast, accurate typist. What he actually needs is a combination "package"—a girl who understands office procedures, uses English effectively, has the right personality, and who has a lot of other knowledge which will make her a competent office worker. He would be very unhappy with somebody who could just typewrite efficiently. In another instance, a businessman might tell us that he wants just a skilled calculating machine operator; but, as educators, we are obliged to give that person enough training and education so that he has an opportunity to rise above his initial job. If we were to prepare just skilled machine operators with no other knowledge and competencies, the businessman would be the first to criticize us. In fact, as business teachers, we *are* criticized for this deficiency.

Many research studies are based upon data obtained by asking businessmen what should be done in business education. In response to the questions addressed to them by researchers, businessmen have given a variety of criticisms of both business education and the employees that they consider to be its product. Unfortunately, many of the researchers who gather these expressions of opinion and criticism seem unaware of the fact that businessmen are more likely to be able to recognize the *symptoms* of problems and difficulties in business education than to recognize the *causes* of these problems and difficulties. Important as it may be to know what businessmen think, it is likely to be a mistake to look to them for the *solutions* of educational problems. No matter how honest and conscientious the businessman may be in his efforts to be of help, he frequently does not know the right answers.

---

[20] Hardin, Garrett, "Science Is Heresy," *Think*, Vol. 26, No. 10, October, 1960, 23-27.

If we had followed majority business practices of years ago, we would still be teaching single-entry bookkeeping and teaching typewriting by the hunt-and-peck system.

We must also remember that businessmen are human. They have certain prejudices, and they are not always fully or adequately informed. Moreover, when they criticize what we are doing and suggest what we should do, they are not familiar with the fact that we often have large classes, inadequate instructional materials and equipment, students with a wide range of abilities, and a lack of needed time to give the kind of education that we would like to give. In fact, if you talk to some of them, you find that they are under the impression that a business student in his four years of high school devotes almost his full time to a study of business subjects. They do not seem to realize that in many high schools it is not possible to build an adequate business education program of four to six units of credit out of a total of sixteen units required for graduation.

These comments might be interpreted to mean that we should not listen to businessmen. That is not the intention of these remarks. We must listen to businessmen. We should, however, seek and interpret the "facts" more carefully in terms of ailments rather than symptoms and in terms of real needs rather than expressed wants. The emphasis should be placed on the needs of the students. If we fill their needs, we shall tend to fill the needs of business.

Answers May Not Be Reliable. Just as great frequency of use does not necessarily insure that a practice is a good one, the researcher cannot be sure that the replies given to questions in a survey are actually true. Particularly on mailed questionnaires, respondents frequently answer questions in the way in which they believe the investigator wants them answered. This result may be due to several things. The questions might not be worded precisely and in a manner that they can be interpreted in only one way. There may be ambiguity in the questions in a survey. Some of the persons replying to the questions may not know the answers, and they will try to save face by giving some kind of answer. An instance is reported in which opinions were asked of a group of people regarding a fictitious act supposedly before Congress. Although no such bill was being considered, 70 per cent of the people questioned expressed opinions about it.[21]

Research May Not Be in Depth. For many years research specialists in business have been aware that some things that appear to be facts are not true facts, and many opinions are not true opinions. In business we have learned that we cannot really believe what people tell us (sad, but true). As a result, some research techniques have been developed in business. These have been given the term, Motivational Research (MR). Another way to describe this kind of research is *research in depth.* It means digging deeper and getting the real facts in an indirect manner. Business is, therefore, employing psychologists and sociologists to help in its research. This kind of research in business is not new. It is pretty well described by Packard.[22] He gives some valuable lessons for people in educational research.

In the history of business research there are many sad examples of what happens when we act on the basis of opinions. For example, one automobile company tabulated the opinions of thousands of people who indicated that they wanted a car that would be short enough for easy parking and with sufficient head room for comfortable seating of passengers. On the basis of these opinions, the designers of this company produced a line of automobiles that were such

[21] Barr, Arvil S.; Davis, Robert A.; and Johnson, Palmer O., *Educational Research and Appraisal*, New York: J. B. Lippincott, 1953. P. 170.
[22] Packard, Vance, *The Hidden Persuaders*, New York: David McKay Company, 1958.

failures that the company almost went out of business because other companies were making lower and longer cars. There are many other examples that can be taken from business to illustrate the point that what people say is not really what they mean. People are not always sure what they mean, and it takes a properly trained specialist to apply some research in depth to find the real answers.

People do not really "lie"; they just don't tell the truth or the whole truth. Many people do not even *intend* to misinform you; they want to tell you what they think you *want* them to tell you, and they often are human enough to protect their own *vanity*. For example, an office manager may not admit that his typewriters are ten years old; but if he is in a very bad mood and is angry with his boss, he may tell you that his typewriters are twenty years old.

In education we can find many examples of how people give us the wrong answers. For instance, after a television program in teaching typewriting was given to several hundred people, these people were asked to fill out a questionnaire and indicate what speed, accuracy, and practical help they obtained from the training. Almost unanimously they gave very favorable reports which indicated that the television teaching of typewriting was very successful. However, actual facts, on careful investigation of individual cases, showed that speed and accuracy were lower than indicated and that many of these people were not following up and using what skill they had developed in the course.

Questions May Not Elicit Required Information. Again, the questions asked may not give the investigator the kind of information he wants or needs. Many surveys make use of ratings of the importance of certain characteristics, practices, drills, or procedures. For example, one might ask a banker to rank the importance of a list of characteristics such as honesty, accuracy, and neatness. Actually, they are all important and one without the other is of little value. An honest bank clerk would not be satisfactory unless he is accurate; and an accurate bank clerk is less than useless if he is not honest. Thus asking for ratings of such characteristics does not give information that would help build a better business education curriculum.

A businessman in a given city may be asked what characteristics he desires in a typist. Generally he thinks and answers in terms of such commonly named characteristics as speed, accuracy, pleasant personality, and ability to get along with people. His answer is honest, but it is incomplete because what this particular man needs for the positions he has for typists are people with a knowledge of the interrelationships of the various aspects of business. Again, just asking about characteristics does not yield the information that would be of most importance to someone concerned with business education curriculum problems in that particular city.

Sample May Not Be Appropriate. An extremely important danger in the use of the questionnaire is that unless a very high percentage of returns is obtained, the findings will not be representative of the population about which the investigator wants the information. Relatively greater numbers of replies are received from people to whom the problem being studied is of extreme importance. In opinion polling, those who feel most strongly one way or the other about the issue involved are most likely to answer questions. Follow-ups are necessary to get replies from the nonrespondents, for the only way to reduce the error caused by nonresponse is to increase the proportion of the sample from whom replies are received.

The value of a survey, whether by questionnaire or by interview, depends not only on the technicalities of its construction, but also upon the people from

whom the information is being solicited. The selection of a proper group to survey and the proper selection of individuals from within the group are of utmost importance in insuring reliable and usable information.

The results of surveys depend on the caliber of the people who give the opinions and answers to the questions. Are those who are to be questioned qualified to give the answers. Do they have the necessary background, experiences, and information needed to reply intelligently to the questions? The people surveyed should also be interested in the problem at hand or personally have something at stake in the results obtained. It is when people are interested that they will take the time to fill out questionnaires carefully and candidly.

The entire group of people of a certain classification about which the researcher wishes information is known as the population; example, all the superintendents of schools in a given state. However, in many instances, surveying a whole population would be too costly, both in terms of time and of money. Therefore, it becomes necessary to select a sample from the population which will provide accurate information about the population it represents. This is the step where many survey users fall down.

The proper selection of samples is basic to the validity of the results of the investigation. Having a supervisor or teacher select two or three "typical" classes does not assure that the classes are truly representative of all the classes from which the sample could be selected. Unconsciously (but naturally) the one selecting will tend to choose the better classes as "typical." Selection of "typical" or "representative" groups introduces a bias into the investigation, and the degree to which it affects the results cannot be determined. We cannot tell how different the sample is from the population from which it was chosen if such bias is present.

The simplest way to eliminate bias is to use a *random* sample, preferably by using a table of random numbers.[23, 24] Books on research methodology and those on sampling give detailed instructions for using these tables. Objective conclusions can be drawn only from samples that are unbiased. If the individuals comprising the sample are randomly chosen, the extent to which the sample differs from the population decreases as the size of the sample is increased. However, this is *true only for a random sample.* In other words, information obtained from a sample of 10,000 "typical" or "representative" individuals is not as reliable as that obtained from a properly chosen random sample of 500 or even of 100. If the sample chosen is not randomly selected, the findings can be applied only to the sample itself; but if the sample is a random one, the findings may, with a stated degree of confidence, be generalized to the population from which the sample was drawn. Randomization is an important key to reliability in research.

Lack of Proper Perspective. Some business educators seem to be more concerned with the "how" rather than the "why" or the "what" in teaching. Many studies are concerned with how particular aspects of a task or job should be performed and with what degree of accuracy. Perhaps of more importance, however, is *what* a worker should know about business in which he is employed and *why*, or what he should know about business as a whole, and why, in order to make the particular task meaningful.

Such a lack of perspective is often shown in the views expressed about office training, for example. Many follow-up studies seem to assume that merely

[23] Fisher, Ronald A. and Yates, Frank, *Statistical Tables for Biological, Agricultural and Medical Research*, London: Oliver and Boyd, pp. 126-131, 1957.
[24] Rand Corporation, *A Million Random Digits with 100,000 Normal Deviates*, Glencoe, Illinois: Free Press, 1955.

finding out what kinds of jobs are performed in the office most frequently will furnish proper guides to business educators in determining course content or even the whole business education curriculum. Often the further assumption is made that developing a high degree of skill on these most frequently mentioned jobs or tasks will properly prepare the student for success in employment.

In business education we often confuse the means with the end. We concern ourselves too much with the narrow aspects of a job and seek to develop evidence along narrow lines to justify what we want to do. We lack perspective. We look at the functions and duties that are performed, but we overlook the knowledge that is needed along with the skills. We tend to think too much in terms of training rather than of education.

This lack of perspective is often shown in our views of office training. We seem to think that we should find out merely what kinds of jobs are performed in the office and then develop a high degree of skill on these jobs. Perhaps it would be better to develop a high degree of basic skills *and* knowledge, such as in typewriting, filing, business arithmetic, and bookkeeping, together with a general knowledge of office procedures, a reasonable skill in office-machine operation, and good personality and work habits.

Avoid Use of Wrong Assumptions. Even though the facts of our research endeavor may be accurate, there is a question whether we have used the proper assumption to guide the solution of our problem. We may actually find that on the *first* clerical jobs people sort papers, check figures, do straight typing, and a number of other routine tasks. We often seem to assume that if we approach this problem *directly*, we shall solve it. We, therefore, think that the solution is to develop a high degree of skill on these routine tasks. In other words, we set up "straw men" and knock them down. There is considerable question as to whether the problem should not be solved a little more indirectly through more basic education. Some of the basic skills and understandings include typing, arithmetic, filing, English, and office procedures.

We sometimes proceed to collect our facts and to solve our problem in accordance with our assumptions. If we have made the wrong assumptions, we tend to proceed to collect wrong or inadequate facts and, consequently, make wrong conclusions.

In our occupational studies we frequently dwell merely on the kinds of jobs (names or classifications) which are available for our high school graduates. It is more important to know *what is required* in these jobs. Then we begin to get a picture of a vocation. If we examine any of the combination of studies that have been made in such places as Green Bay, Seattle, and Tacoma, we discover that there are many common elements among business occupations, as in offices and stores, and that these common elements generally prevail in towns and cities throughout the country. It is these common elements that must be kept in mind in order to have a comprehensive and an intelligent overview of a vocation. We also need to know what aspects of a high school graduate's education in his business employment have been particularly helpful and what educational deficiencies have become especially apparent. With this kind of information available, there is a substantial basis on which to build an educational program for a vocation.

Weakness of the Rule of Frequency. As an illustration, a long list is developed of duties that are performed in an office, and the assumption is made that this list, to use an absurd example, includes pencil-sharpening. This activity is found to be performed by everyone in the office. Therefore, the

reasoning goes, pencil-sharpening should be part of business education preparation. Of course, this is farfetched, but it is the kind of thinking which leads to unsound conclusions.

Instead of assuming that frequency of occurrence determines importance, other phases of the problem should be studied: How difficult is the task to learn? How difficult is it to teach? Can it be better learned on the job or in school, or both? Is it something learned in the course of a person's business experiences? Are time and equipment available for it in school in view of many other educational needs of students?

It is not the duties themselves that are basic. It is more important to know what skills, knowledges, and personal qualities are needed to perform the duties satisfactorily.

The frequency pattern on a check list does not provide the whole answer. Perhaps it would be better to develop a high degree of basic skills and knowledges, such as typewriting, filing, business arithmetic, bookkeeping, and a reasonable skill in office-machine operation, together with a general knowledge of office procedures. Only through adequate research can we determine whether or not, or when, this is true.

But this phase of the problem is frequently neglected in research, perhaps because this type of information is more elusive and sometimes more difficult to obtain than some other data. Because of the value of the information if properly collected, however, such studies would be worth the extra effort in providing the proper information on which business education programs should be built.

Failure to Penetrate the Problem. Along with the problem of a broader perspective regarding what should be included in office training, for instance, and how it should be taught, is that of studying all aspects of a problem. Teaching the mechanics of operation of a particular calculating machine may not be sufficient. For some very routine position, or for certain types of people, this may be enough, while for other employees such training would be woefully lacking. But unless the question is studied mainly in light of knowledges required, rather than of skill required, business education may be merely training for business rather than educating for business.

There are many other problems which need to be investigated deeply. For instance, the question of how children learn cannot properly be investigated as a single problem. Rather, each of the commonly accepted principles of learning should be specifically studied in the various business education areas to determine how best to utilize these principles: What is the best use of drill in skill development—what kind? How much? How can we develop in our students problem-solving ability? What is the most effective way to increase retention of knowledges and skills? What is the effect of fatigue on learning skills and in gaining knowledges? When all such questions, and many others, are specifically and individually studied and the findings pooled, then we shall have investigated the problem of how learning takes place in our business classes. It is not a problem that can be studied as a single unit with superficial, broad treatment.

Too many research projects do not dig deeply enough and include all the implications of the problem. For example, surveys are made of the office equipment used in local business communities to determine the equipment needed in schools. The equipment that is used is only part of the story, and it is not the most important part. It is only the beginning of what should be a deeper investigation. Among other things we need to know:

1. Is the use of this equipment basic and essential in office education?

2. Even if the use of the equipment is basic, is there anything aboout its use that should be taught, or can the skill in using it be pickced up easily?
3. Should the skill and understanding of the equipment be taught in school?
4. Should the use of the equipment be learned on the job?
5. Can the time in school be used to better advantage by dealing with other educational needs of students?
6. Should schools keep ahead of business or follow business in equipment?
7. Can the school afford the equipment? (In some cases, there are types of equipment on which some profitable training can be given, but it is entirely too expensive for a school. The training will have to be obtained on the job.)
8. How much time does it take to learn the use of equipment and how much skill and knowledge are needed?
9. How difficult is it to learn to use the equipment?
10. How important is the knowledge and use of the equipment to success on the job?
11. What important related knowledge, as in business arithmetic, is required in the operation of the equipment?
12. Have teaching materials been well developed to give instruction on the equipment?
13. How well qualified are teachers to give the necessary instruction?
14. Will the equipment be used enough from day to day to justiffy its purchase?
15. How soon will the equipment be likely to become obsolescent?

There is such a limited amount of time allotted to the business program in high school that in most cases the training and education must be devoted to the knowledge and fundamental skills that are common to most bussiness jobs and occupations. Moreover, the young worker has to learn on the job certain procedures and the use of equipment peculiar to the particular job in which he is employed. There are so many variations in procedures and equipment of business concerns that it would be impossible for a high school to provide preparation to cover all these variations. Then, too, there are many kinds of equipment that are so simple to operate that it is not necessary to give training in their use except as these fit into the general pattern of equipment necessary for the school to provide a good office training program. It should be remembered that business concerns themselves, in cooperation with the high school, have a responsibility to provide certain kinds and amounts of training on the job. Vocational preparation of prospective business workers is a joint responsibility of both business and school.

One Thousand Casual Opinions vs. One Careful Observation. It is common practice in educational research to believe that a study is not reliable and valid unless it has a lot of cases. In many instances, however, a more critical but limited study might produce better results. For example, on the one hand, there might be a study of opinions of 1,000 office managers. On the other hand, a researcher might go into one office and spend considerable time making some *research in depth* by asking careful questions, observing, and actually performing the various duties. The results of these observations are likely to produce better conclusions as to the needs for a business education program than could

be obtained from the study of 1,000 questionnaires. In other words, a few good samples critically studied are better than a lot of poor samples. One competent person's careful observations are better than many casual and irresponsible opinions. It is easy to get advice, but if you have to sink or swim on the basis of your own conclusions, you are likely to be more careful in making those conclusions. We might sum this up by saying that sometimes good reasoning based on critical observations is better than conclusions based on mass "facts." However, be sure your observations are not guided by bias.

CONCLUSION

Business educators must try new things; must dare to break away from tradition. And it is in the evaluation of the new ideas that experimental research is especially important. Only through controlled experiments can the value of new ideas be fully and rigorously determined.

Along with this is the need for knowledge of research methods and especially about experiments so that the readers of research can understand and appraise what has been done in order to ferret out the soundly based conclusions. When the reader can evaluate the appropriateness of the research method used, he is not so likely to accept ideas merely because they "sound good" or to reject them because they sound farfetched. By the selective retention of the sound ideas from research, business education will move forward.

Through properly conducted research, business education can be improved. Research is the principal means of finding reliable and valid answers to our problems. Perhaps experimentation is necessary to provide the answer, or perhaps the normative-survey method is the proper approach to a particular question. Others will find historical or other research methods more appropriate to their purposes.

Regardless of the method used, only proper techniques and instruments for gathering data will provide the kind of information on which conclusions should be based. However, only if the data are analyzed and the findings interpreted properly will the conclusions be valid; and only if proper sampling has been done in the first place can the conclusions be applied to groups other than the one on which the data were collected.